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Daniele Magda, Cyril Agreil, Laurent Hazard, Muriel Tichit, Daphné Durant, Anne Lauvie, Elisabeth Lécivain, Gilles Martel, Bénédicte Roche, Rodolphe Sabatier, et al.

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Livestock farming systems and biodiversity : from trade-offs to synergies

Danièle Magda and C. Agreil, L. Hazard, M. Tichit
magda@toulouse.inra.fr

*and collaborators : Durant D., Lauvie A., Lécivain E., Martel G.,
Roche B., Sabatier R., De Sainte Marie C., Teillard F.*



**SAD – Sciences
for Action and Development Division**



ALIMENTATION
AGRICULTURE
ENVIRONNEMENT

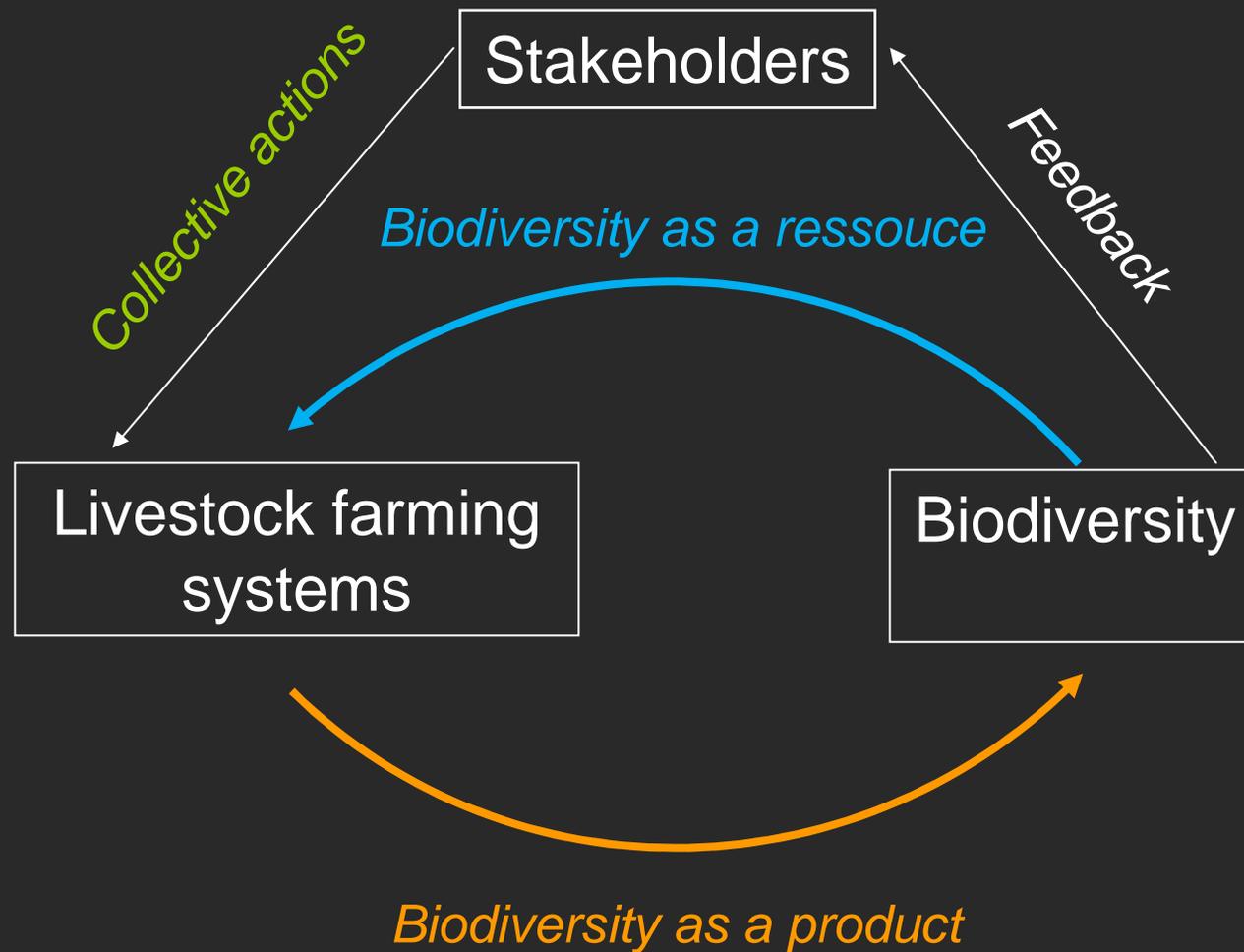
INRA

Introduction

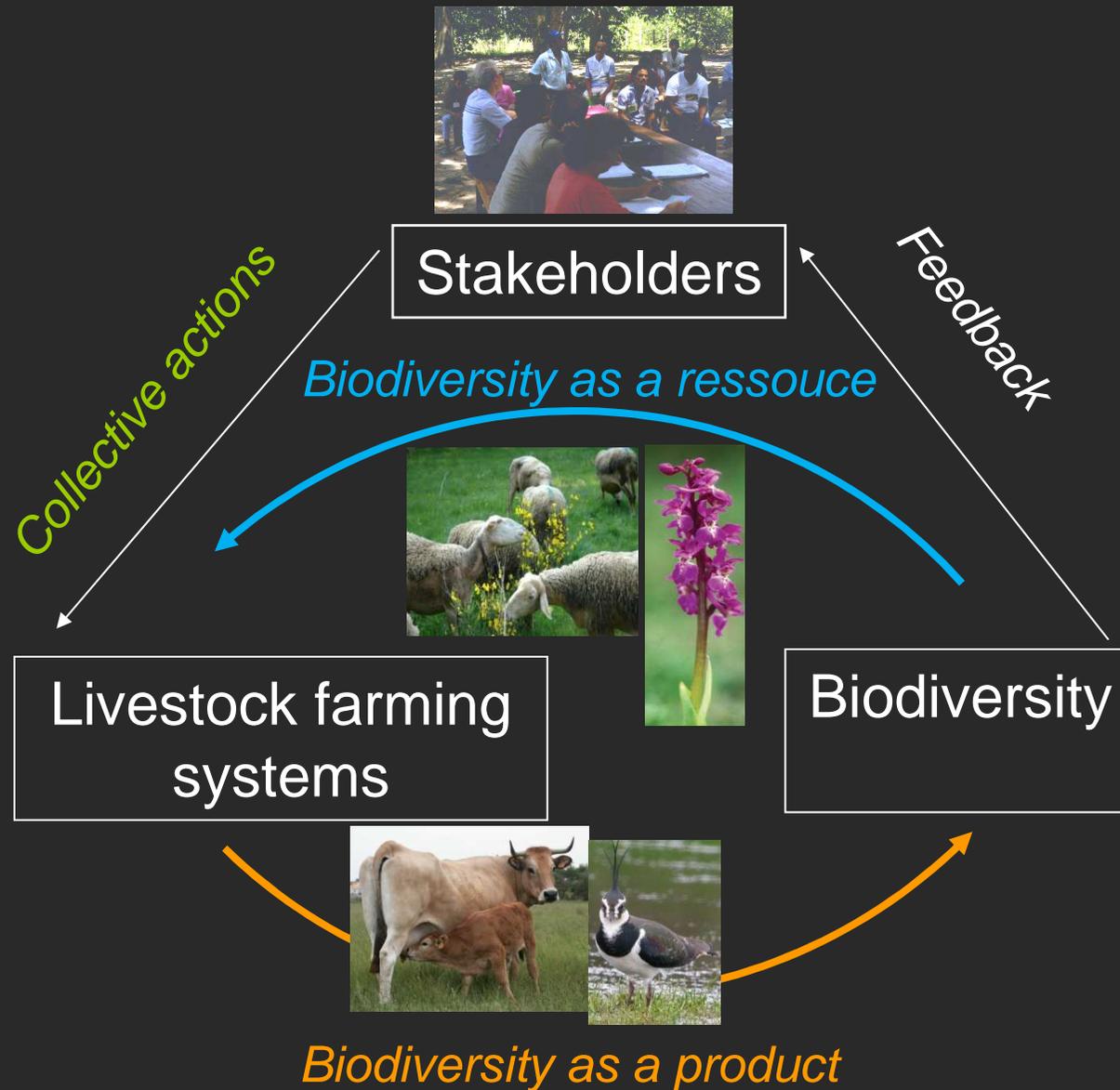
- Biodiversity back in productive systems (*Altieri & Nicholls 2005*)
- Farmers involved in the management of high nature value areas through agri-environment schemes (AES)
- Effectiveness of AES **still under debate** (*Kleijn 2006; Butler 2007*)
- A novelty : result-oriented schemes (*Klimek 2008; Verhulst 2007*)
 - managing **agroecological states**
 - necessity of **closer links** between production and ecological systems
 - but lack of knowledge to do so



A new view to construct **functional** links between livestock production and biodiversity



A new view to construct **functional** links between livestock production and biodiversity



Case study 1–Tradeoffs between livestock production and bird biodiversity in grasslands

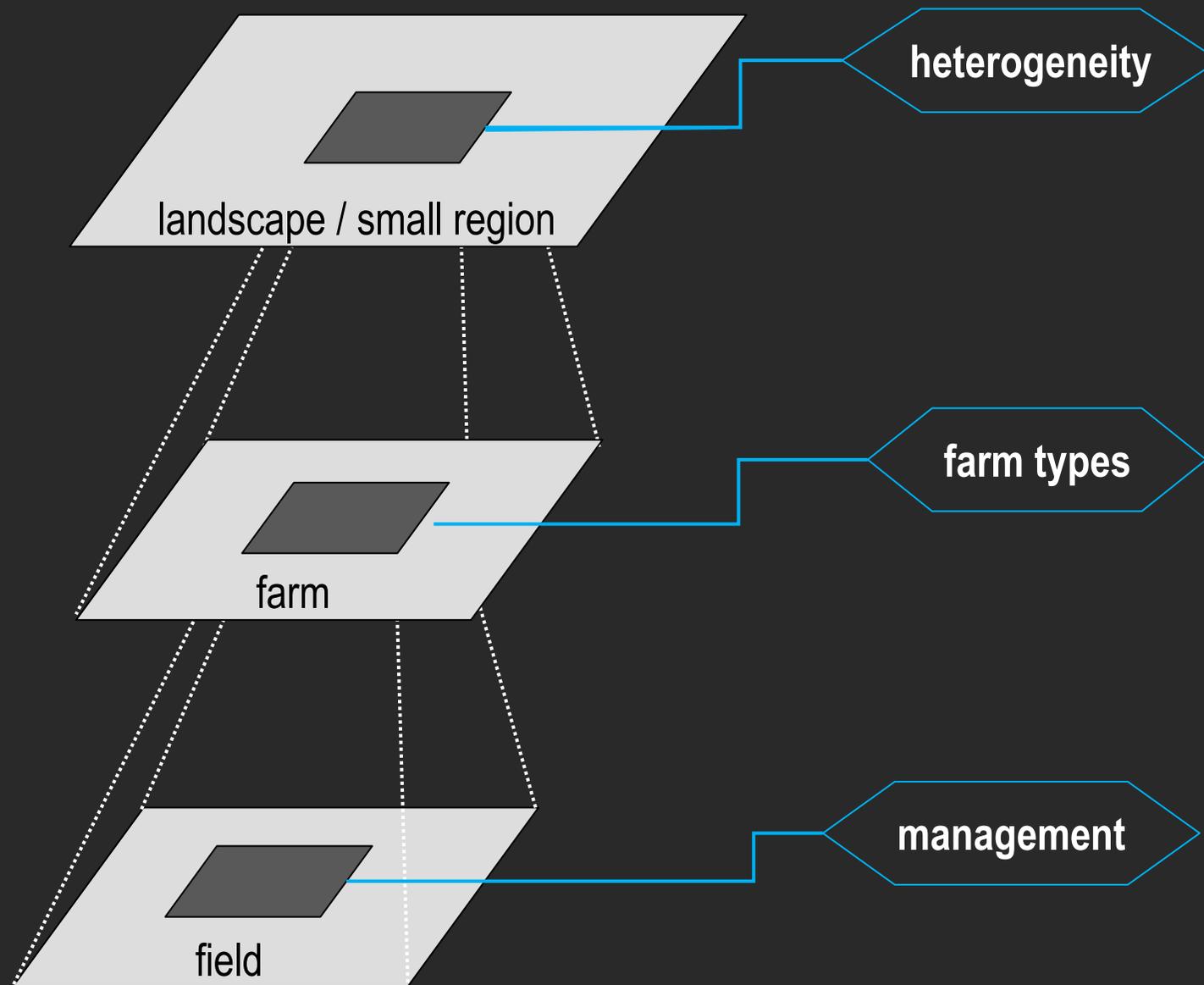


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CS 1 - Multi-scale tradeoffs between livestock production and bird biodiversity in grasslands

Each level
= a specific
driver for
tradeoffs



Sabatier 2011
Sabatier et al. 2010
Tichit et al. 2007

CS1 – Diversity in management regimes plays an important role in tradeoffs



**Diversity =
central
mechanism**

Diversity
**within
farm**

Martin et al. 2009

Diversity
**between
fields**

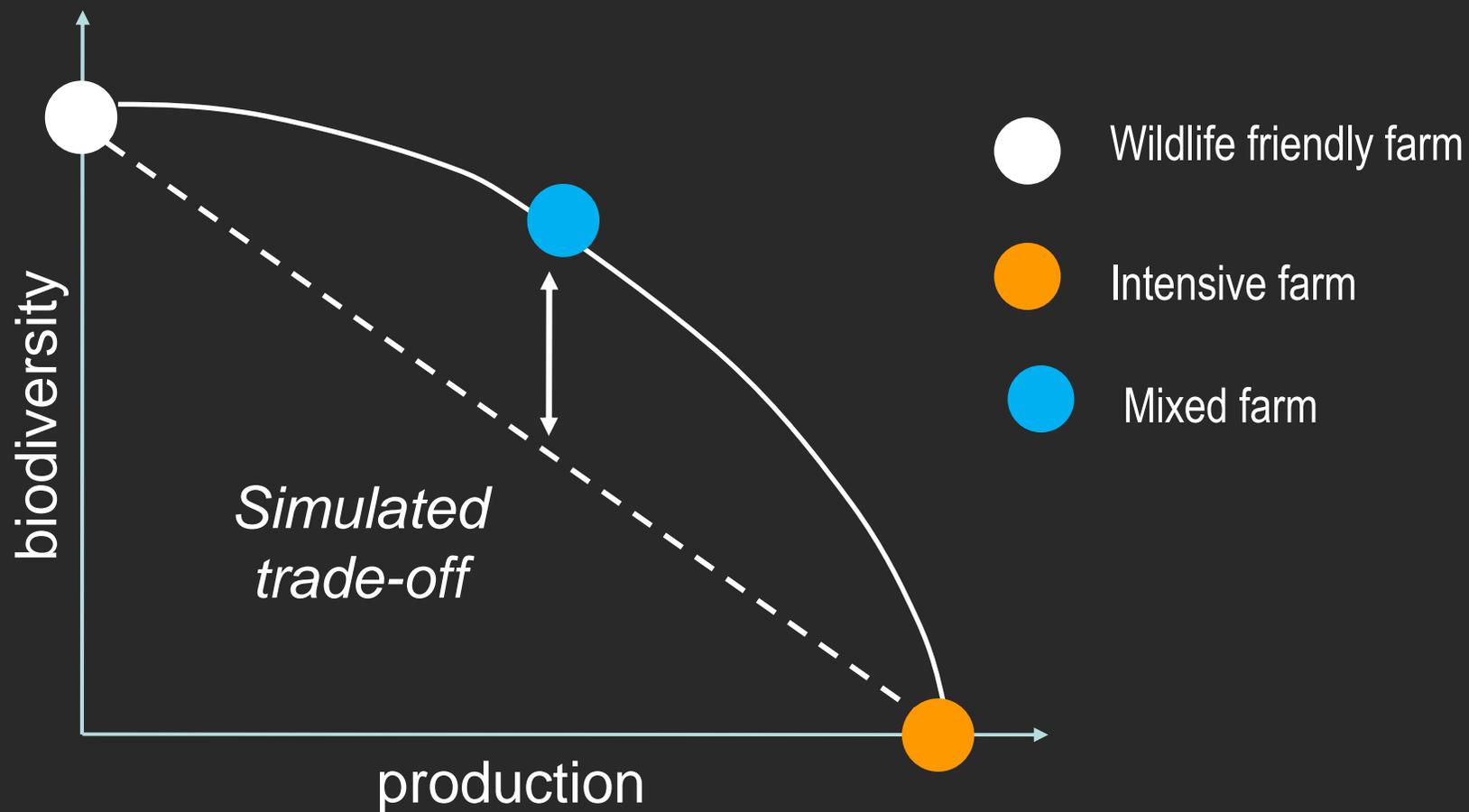
Durant et al. 2008

Tichit et al. 2005

Diversity
in time

Sabatier et al. 2010

CS1 – At farm level : importance of interactions among management regimes



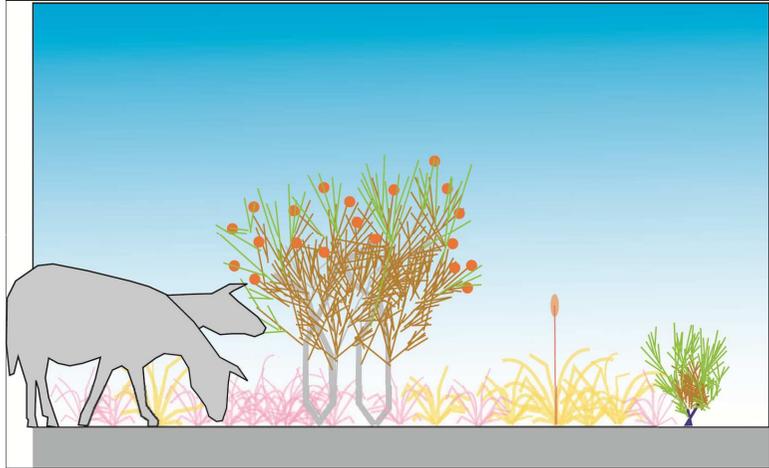
Case study 2 – Rangeland biodiversity as a resource for animal production



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CS 2 – Defining functional biodiversity from feeding behaviour



Animal **valorises** the diversity !

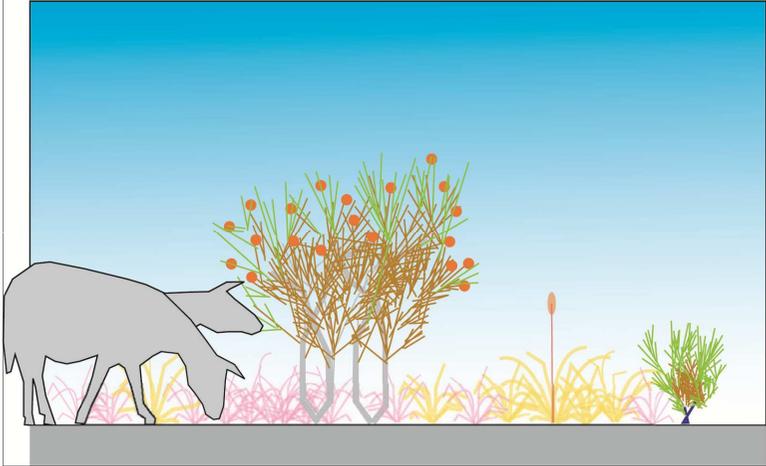
Agreil et al. 2005

Resource = diversity of **feed items**



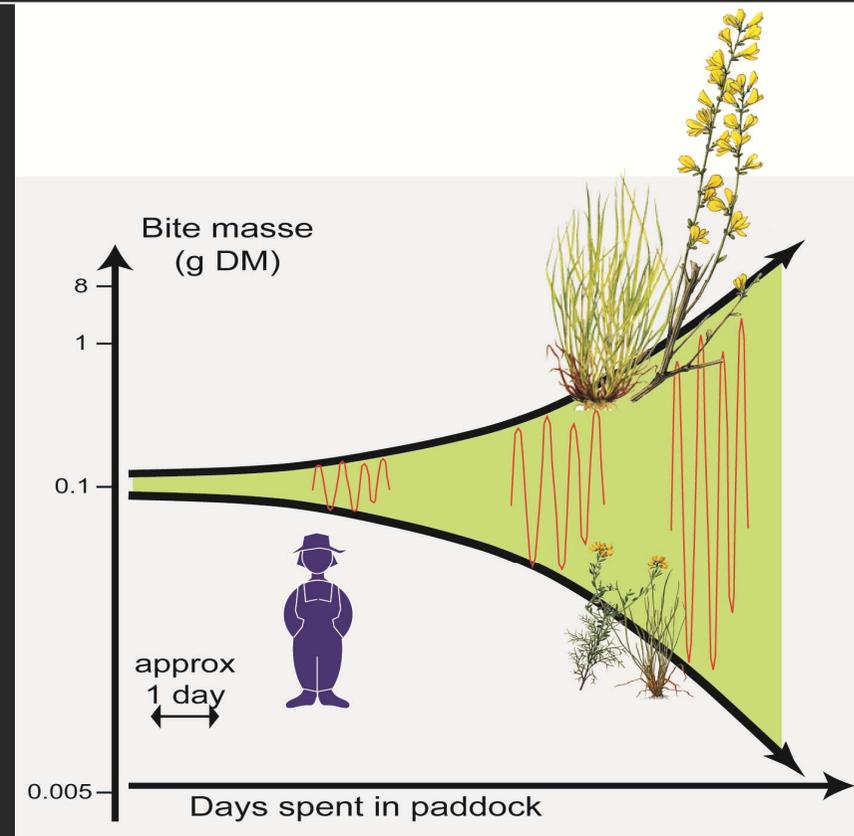
Functional diversity \neq specific diversity

CS 2 – Defining functional biodiversity from feeding behaviour



Feeding behaviour is
adaptive

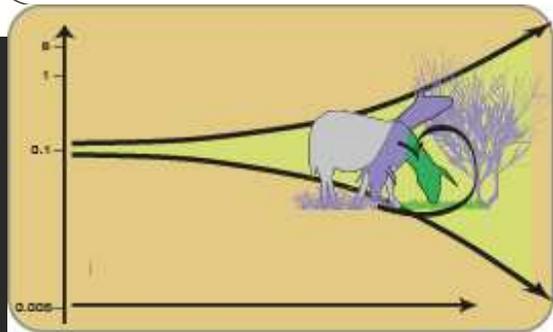
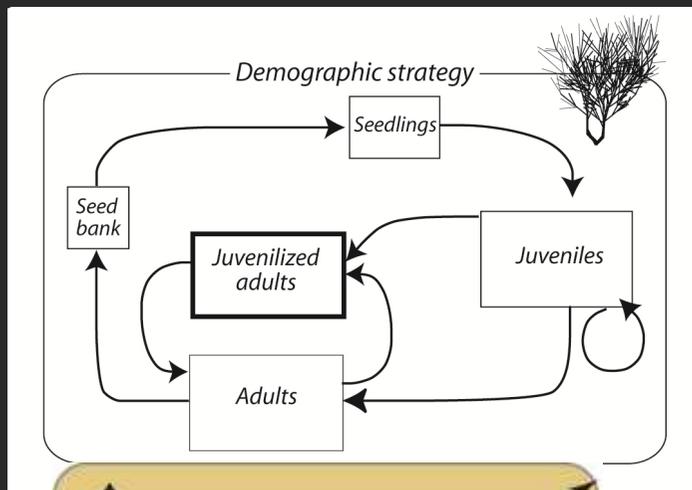
Agreil et al. 2008



The feeding choice of the
animal **changes over time**

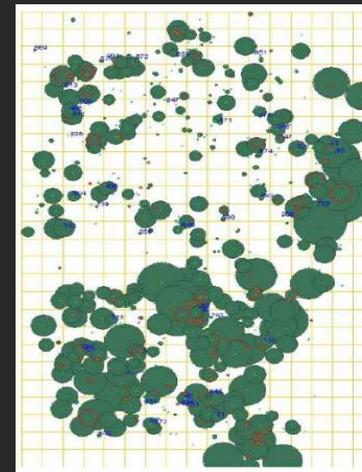
CS 2 – Understand the role of grazing on dominant shrub to manage biodiversity

Demographic strategy of shrub gives the **target** stage to be grazed



Magda et al., 2010
Pontes et al., 2010

Regulation of population dominance by managing **links** between feeding behaviour and population **process**



Case study 3 – Domestic biodiversity as product and resource for livestock production

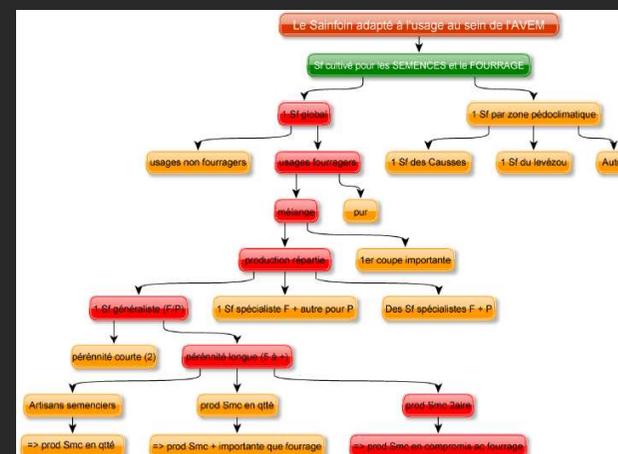
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Case study 3 – Domestic biodiversity as product and resource for livestock production

Creation of «**houses of seeds**» for **local** genetic resources conservation:

- seed exchanges and quality control,
- participatory plant breeding,
- social learning network.



Design workshop
to create forage ideotypes



Perspectives and Challenges

- Back to **complexity** and **uncertainty**
- Adaptative management as a relevant framework to design agroecological production schemes :
 - Production with ecological dynamics as **a learning process**
 - local definition of technical references
- New scientific challenges
 - understand **interactions** between production and ecological **processes**
 - provide **innovative** tools to support stakeholders actions
 - articulate scientific and **empirical knowledge**

THANKS FOR YOUR ATTENTION

